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From tissues to cells and back: Microfluidics-enabled solutions for parallel and time-resolved multi-parameter characterization of individual cells across a population

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A set of techniques to separate, analyse and manipulate single cells provided from a suspension, e.g. as obtained from tissue samples will be presented. Taking advantage of effects specific to microstructures or microconfinement, the cellular response of exposure to a sequence of stimuli and stains can be monitored for all cells within a cohort in parallel and even in real time. Cells of interest may be selected and forwarded to further analysis, e.g. for content screening or propagation. The presented microfluidic systems have proven to work with label-based methods, typically for validation, as well as direct photonic "fingerprinting" and to resolve valuable detail on population statistics and dynamics way beyond averages based on end-point assays. Examples are studies on glycosylation, secretion and inflammation, for instance to relate affected tissue to the onset of cardiovascular disease.

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